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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/821,135

04/08/2004

David C. Collins

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INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400

EXAMINER

SITTA, GRANT

ART UNIT

PAPER NUMBER

2609

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/821,135

Applicant(s)

COLLINS ET AL.

Examiner

Grant D. Sitta

Art Unit

2112

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 20-33 is/are rejected.
- 7) ☒ Claim(s) 16-19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____  |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date  
:4/8/04;12/27/04;7/29/05;12/1/05.

### ***Double Patenting***

1. Claim 1 provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1 and 2 of copending Application No. 20050225570. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.
2. Claim 1 rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 7,109,981. This is a double patenting rejection.

### ***Specification***

3. In the cross-reference provide the U.S. patent application Serial Number for the docket number 200400519-1 and 200400670-1
4. The disclosure is objected to because of the following informalities: The last sentence of paragraph [0193]. It is not clear whether "FIGS. 19B and 19E" was meant instead of "FIGS. 19C and 19D."

If applicable, appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
6. Claims 8, 12, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how the fifth, sixth, seventh and

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eighth sub-frames are generated from the error image and the first, second, third and fourth sub-frames.

7. Claims 21 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear the means for generating the error image from the simulated image and the image data. How does one generate the error image?

8. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear the means for generating the fifth, sixth, seventh and eighth sub-frames using the error image, a sharpening factor, and the first, the second, the third, and the fourth sub-frames. How is the sharpening factor applied?

9. Claim 30 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how the fifth, sixth, seventh, and eighth sub-frames are generated using the error image from the first, second, third and fourth sub-frames.

***Claim Rejections - 35 USC § 101***

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 20-25 and 26-33 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 20-25 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. A "means" is being recited; however, it appears the means would reasonably be interpreted by one of ordinary skill in the art, as just "receiving, generating and calculating" Applicant does not claim any concrete results such as the storage or display of results. "Receiving, generating and calculating" does not fall within a statutory category since it is clearly not a series of steps or acts to constitute a process, not a mechanical device or combination of mechanical devices to constitute a machine, not a tangible physical article or object which is some form of matter to be produced and constitute a manufacture, and not a composition of two or more substances to constitute a composition of matter.

Claims 26-33 are rejected under 35 U.S.C. 101 for the same reason as stated above.

### ***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 2, and 13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Gibbon et al. (US PUB 2003/0020809) hereinafter, Gibbon.

13. As to claim 1, Gibbon teaches a method of displaying an image with a display device (See paragraph [0001]), the method comprising:

Receiving a first set of image data for a first image (See paragraphs [0012], [0031]);

14. Generating a first sub-frame (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0034]-[0035], figs. 13 and 15(102)) a second sub-frame (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0034]-[0035] figs. 13 and 15(102))) such that the two resulting sub-images are offset by one half of a pixel in both the horizontal and vertical directions, allowing the two sub-images to combine to produce a final image having a greater resolution than the that provided by the actual pixels (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0034]-[0035], [0012]. Gibbon also teaches alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position (See Fig. 5-7, paragraph [0036]).

15. As to claim 2, Generating a first sub-frame (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0034]-[0035] figs 13 and 15(102))), a second sub-frame (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0034]-[0035] figs 13 and 15(102))), such that the two resulting sub-images are offset by one half of a pixel in both the horizontal and vertical directions, allowing the two sub-images to combine to produce a final image having a greater resolution than the that provided by the actual pixels (See Fig. 5, item 33 and Fig 6., item 41, paragraphs [0012], [0034]-[0035]).

16. As to claim 13, Gibbon teaches a system for displaying an image (see paragraph [0001]), the system comprising:

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DMD projection system, which is inherent to have a buffer, adapted to receive a first set of image (See paragraphs [0012], [0035]);

An image processing unit configured to define first sub-frame (See Fig. 5, item 33 and Fig. 6, item 41, paragraphs [0034]-[0035]) and a second sub frame (See Fig. 5, item 34 and Fig. 6, item 51, paragraphs [0034]-[0035] figs 13 and 15(102)) [third and fourth sub frames]) corresponding to the first set of image data and wherein the second set of pixels is centered by one half in the horizontal and vertical directions (see paragraph [0012]).

A display device adapted, alternately displaying the first sub-frame in a first position and display the second sub-frame in a second position spatially offset from the first position (See Fig. 7, paragraph [0036]). With both frames containing sub frames (See Fig. 5, item 34 and Fig. 6, item 51, paragraphs [0034]-[0035] figs 13 and 15(102)) [third and fourth sub frames]).

### ***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



18. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. Claims 3-6, 20, 26, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable Gibbon et al. (US PUB. 2003/0020809) taken with Carlson et al. (US 6,650,704), hereinafter, Gibbon and Carlson, respectively.

20. Relative to claim 3, Gibbon teaches generating images in sub frames (figs 13, 15 col. [0046], [0050]).

21. Gibbon fails to teach a simulated image by convolving the first, second, third and fourth sub-frame with an interpolation filter.

22. Carlson teaches a method of processing a low resolution input frames containing undersampled views of an optical image to produce a higher quality, higher resolution output frame (Abstract). Carlson teaches taking input frames than convolving these input frames with working frames, which are fractionally shifted input frames (See Figs 1, 2 and 5 col. 8, lines 15-32).

23. It would have been obvious to a person of ordinary skill in the art at the time of the inventions to combine Gibbon's image displaying system with the method of simulating image by convolving as taught by Carlson in order to provide a high

resolution quality image, as a single still image, or may produce a series of high resolution output frames as a video sequence (col. 4, lines 32-34).

24. As to claim 4, interpolation is upsampling followed by a filter. Carlson teaches interpolation with the working frame. (See col. 16-17, lines 60-4) The next step would be a filter. Carlson teaches applying such a filter (See col. 16-17, lines 60-4) As for the size and coefficient values those would have been apparent to one skilled in the art.

25. As to claim 5, see claim 4.

26. As to claim 6, see claim 4.

27. As to claim 20, Gibbon teaches a means for receiving image data corresponding to the image (See paragraphs [0006], [00012]) the means for generating the first, the second, the third and the fourth sub-frames using the image data (See Fig. 5, items 33-34 and Fig. 6, items 41-51, paragraphs [0034]-[0035] figs 13 and 15).

28. Gibbon fails to teach convolving each of the sub-frames, having plural pixel values, with at least four other sub-frame pixel values.

29. Carlson teaches a method of processing low-resolution input frames to produce a high-resolution output frame (col. 4, lines 29-35). Carlson teaches sampling at sub-pixel precision (col. 4, lines 41-45). These low-resolution input frames are convolved with shifted blocks called working frames (See col. 8-9, lines 45-15). Carlson also teaches convolving with a kernel (See Fig. 9, col. 12-13, lines 60-5)

30. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide to the methodology as taught by Gibbon with the features of Carlson in order to provide a high resolution image.

31. As to claim 23, Carlson teaches a method of processing a low resolution input frames containing undersampled views of an optical image to produce a higher quality, higher resolution output frame (Abstract). Carlson teaches taking input frames then convolving these input frames with "working frames," which are fractionally shifted input frames (See Figs 1, 2 and 5 col. 8, lines 15-32). It also would have been obvious to one skilled in the art to convolve with eight or more sub-pixels, as these sub-pixels are the adjacent sub-pixels.

32. As to claim 26, Gibbon teaches a computer-readable medium, having computer-executable instructions for performing a method of generating low resolution sub-frame for display at a spatially offset positions to generate the appearance of a high resolution image (See paragraphs [0006], [0012]), the system comprising:

Receiving image data for a plurality of high-resolution images (See paragraphs [0006][0012]);

Generating a plurality of sets of low resolution sub-frames based on image data, each set of low resolution sub-frames, first, second, third and fourth sub-frames, corresponding to one of the high resolution images (See Fig. 5, items 33-34 and Fig. 6, items 41, 51, paragraphs [0034]-[0035]).

33. Gibbon does not disclose convolving the first, second, third, and fourth sub-frames with an interpolating filter.

34. Carlson teaches in one embodiment interpolation to upsample the resolution (See col. 21, lines 25-32). With the coefficients for the interpolation depending on the position of the new pixels and old pixels (See col. 21, lines 25-33). These low-resolution

input frames are convolved with shifted blocks called working frames (See col. 8-9, lines 45-15). Carlson also teaches convolving with a kernel (See Fig. 9, col. 12-13, lines 60-5).

35. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the methodology of Gibbon with the teachings of Carlson to produce a high-resolution image. The size of the interpolation filter and the filter values would have been obvious to one skilled in the art.

36. As to claim 27, see claim 4

37. As to claim 28, see claim 4

38. Claims 7-12,14-15, 21-22, 24-25 and 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Carlson above, and further in view of Young et al. (US PUB. 2003/0063190) hereinafter, Young.

39. As to claim 7, Gibbon and Carlson teach generating images in sub frames (figs 13, 15 col. [0046], [0050] Gibbon) and Carlson teaches taking input frames than convolving these input frames with working frames, which are fractionally shifted input frames (See Figs 1, 2 and 5 col. 8, lines 15-32)

40. Both Gibbon and Carlson, fail to teach a method of generating an error image by subtracting the simulated image from the image data. However, Young teaches subtraction in first and second sub-frames particularly for error detection (See paragraphs [0004], [0042]).

41. Therefore, it would have been obvious to one skilled in the art to combine the method of error image subtracting as taught in Young with the system of Gibbon as

modified by Carlson because Young's method of inspection can be applied to two similar images for error detection. Sub-pixels alignment is often necessary to obtain a degree of accuracy ([0002], Young).

42. As to claim 8, Gibbon teaches sub frames (figs 13 and 14), and it would have been obvious to one skilled in the art to add two images together to generate another image.

43. Claim 9 is the same methods as taught in claims 7 and 3 and rejected for the reasons stated above.

44. As to claims 10-12, see claim 4.

45. As to claim 14, Gibbon's method has the inherent characteristic that it can be used with two sub-images that don't have the same resolution. So long as alignment is proper the two sub-images will combine to produce a final image having a greater resolution than any single image (See paragraph [0012]).

46. As to claim 15, Carlson teaches generating a third set of pixels by convolving a working frame with an input frame (See col. 8, lines 17-28).

47. As to claim 21, see claim 7.

48. As to claims 22 and 25, Carlson teaches a method of varying a number (alpha) to trade spatial sharpness for speed of response (See col. 20, lines 40-50).

49. As to claim 24, see claim 9

50. As to claim 29, see claim 7

51. As to claim 30, Young teaches using error detection methods on single images and comparing to computer generated data (See paragraph [0042]).

52. As to claim 31 see claim 9

53. As to claims 32-33, see claim 4.

***Allowable Subject Matter***

54. Claims 16-19 are objected to as being dependent upon rejected base claims, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

55. Regarding claim 16, the major difference between the teachings of the prior art of record (Carlson US 6,650,704, Gibbon US PUB 2003/002089, and Young 2003/0016292) and that of the instant invention is that said prior art of record does not teach generating an error image by subtracting the simulated image from the image data, and wherein the image processing unit is configured to generate fifth, sixth, seventh, and eight sub-frames using the error image and the first, the second, the third and fourth sub-frames.

56. Regarding claim 17, the major difference between the teachings of the said prior art of record and that of the instant invention is that said prior art of record does not teach the system to generate first second, third and fourth correction sub-frames from the error image, wherein the image processing unit is configured to generate the fifth, the sixth, the seventh, and the eight sub-frames by multiplying each of the first, the second, the third, and the fourth correction sub-frames by a sharpening factor and adding the first, the second, the third, and the fourth sub-frames to the first, the second, the third and the fourth correction sub-frames, respectively.

57. Regarding 18, the major difference between the teachings of the said prior art of record and that of the instant invention is that said prior art of record does not teach the system to generate a plurality of error data values by subtracting the simulated image from the image data, wherein the image processing unit is configured to generate an error image by convolving each of the error of the error data values with eight adjacent error data values, and wherein the image processing unit is configured to generate fifth, sixth, seventh, and eighth sub-frames using the error image and the first, the second, the third, and the fourth sub-frames.

58. Regarding 19, the major difference between the teachings of the said prior art of record and that of the instant invention is that said prior art of record does not teach the system to generate first, second, third, and fourth correction sub-frames from the error image, wherein the image processing unit is configured to generate the fifth, the sixth, the seventh, and the eighth sub-frames by multiplying each of the first, the second, the third, and the fourth correction sub-frames by a sharpening factor and adding the first, the second, the third and the fourth sub-frames to the first second, the third, and the fourth correction sub-frames, respectively.

### ***Conclusion***

59. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,825,835, US 2003/0016292, US 6,657,603, US 4,442,454

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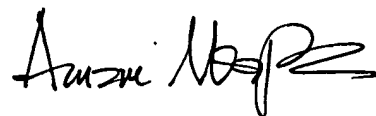
US 2003/0133060, US 5,757,355, US 6,118,584, US 6,104,375, US 5,953,148 and 5,742,274.

***Inquiry***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Grant D. Sitta whose telephone number is 571-270-1542. The examiner can normally be reached M-Th 7:30-5:00.

If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on 571-270-1550. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to USPTO Customer Service Representative or access to the automated information system whose telephone number is 1-800-786-9119 or 571-272-1000.



AMARE MENGISTU  
SUPERVISORY PATENT EXAMINER

Grant D. Sitta

December 18, 2006.